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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,914	10/14/2003	Erez Yahalomi		7454

7590 11/09/2005  
Erez Yahalomi  
Tarpad 8  
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ISRAEL

EXAMINER
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WILSON, SCOTT R

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/686,914

Applicant(s)

YAHALOMI, EREZ

Examiner

Scott R. Wilson

Art Unit

2826



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-8,10,13,16,19,21-23,28,30,31,37-39 and 41-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-8,10,13,16,19,21-23,28,30,31,37-39 and 41-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 July 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

Art Unit: 2826

### ***Claim Objections***

Claims 1, 8, 10, 21, 31, 43, 45 and 46 are objected to because of the following informalities: "compromising" should be replaced by "comprising". Appropriate correction is required, as well as verification of the remaining claims.

### ***Drawings***

The drawings were received on 26 July 2005. These drawings are informal and should be corrected and resubmitted as formal drawings, should the application be allowed.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 5-8, 10, 13, 16, 19, 21-23, 28, 30, 31, 37-39 and 41-48 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), *at the time the application was filed*, had possession of the claimed invention. The specification as originally filed did not contain a written description of the devices shown in Figures 13-15. Applicant should point out where in the specification the devices shown in Figures 13-15 are described.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what applicant means by "the particle state can be revert due to particle bounding to initial state or due to reverting energy".

Art Unit: 2826

Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what applicant means by "limited region".

Claim 42 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 42 recites the limitations "said silicon layer", "said silicon wafer dopants", "said source and drain dopants", and "said metal contacts". There is insufficient antecedent basis for these limitations in the claim.

Claim 45 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what applicant means by "polarization inside the gate". The term polarization conventionally refers to photon polarization. It can also refer to an electrically charged entity with equal and opposite charged maintained at a distance away from each other.

Claim 47 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 47 recites the limitations "said silicon wafer dopants", "said source and drain dopants", and "said metal contacts". There is insufficient antecedent basis for these limitations in the claim. In addition, "said gate" appears to refer to a structure comprised of several separate layers in claim 45, so the meaning of "said gate is made of phosphorus dopants" is unclear.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2826

Claims 1, 2, 5, 5-8, 10, 13, 16, 19, 21, 23, 28, 30 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Kane. As to claim 1, Kane, Figures 1-3, discloses a switching device for switching between two states in computing on or off states, wherein said switched state is determined by the particle occupancy distribution denoted as the particle wave function size in space and wherein the wave function size depends on the particle energy and the switching between the two device states is done by changing the particle energy. Kane discloses a quantum computer array in which the nuclear spin resonance  $^{31}\text{P}$  is adjusted by a voltage applied to an "A-Gate". The electron wave function of the  $^{31}\text{P}$  frequency of atom is pulled away from the nucleus, thereby reducing the hyperfine interaction, which depends on the value of the wave function evaluated at the nucleus. The smaller hyperfine matrix element reduces the nuclear resonance frequency. Kane further discloses an electron mediated nuclear spin interaction, in which an electron couples adjacent nuclear spins. Figure 3 illustrates that the electron coupling is controlled with a "J-Gate". It is this electron mediated nuclear spin interaction which flips nuclear spins, thereby switching between states in a two-state system, which is required for quantum computation. The switched state depends on the mediating electrons wave function size in space, as embodied in Figure 3. The electron wave function size in space is controlled by applying a voltage to the J-Gate, which adds energy to the system, and is within the scope of changing the electrons energy.

As to claim 2, Kane, Figure 2, discloses that in the region immediately below the A-Gate, the wave function size in space increases.

As to claim 5, Kane discloses that the electron wave function size in space is controlled by applying a voltage to the J-Gate, which adds energy to the system, and is within the scope of changing the electrons total energy.

As to claims 6 and 7, Kane discloses that the electron wave function size in space is controlled by applying a voltage to the J-Gate, which adds energy to the system, and is within the scope of changing the electrons kinetic energy, and the potential felt by the electron.

Claims 16 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Field et al.. As to claim 16, Field et al., Figure 1, discloses a device comprising a container, embodied as a quantum dot, in

Art Unit: 2826

which two charged zones, embodied as gate electrodes, indicate the state of the particle wave function, by measurement of their voltages.

As to claim 21, the gate electrodes in the quantum dot device of Field et al. may be subdivided into abutting conductive elements.

Claim 22 is rejected under 35 U.S.C. 102(b) as being anticipated by Field et al.. Field et al. (Reference 1 of Information Disclosure Statement filed 23 December 2004), Figure 1, discloses a switching device for switching between two states comprising a container of two regions, embodied as a quantum dot structure, where in one state the particle is in one region and in said second state said particle is in said second region wherein in near second region there is at least one element (gates G3 and G5) for detecting voltage or current change due to the present of the particle in second region, wherein the particle movement is embodied as tunneling.

As to claim 28, Kane, Figures 1-3, discloses a switching device comprising a region which creates a potential on a particle, wherein the particle size is dependent on the potential value, thus achieving two states denoted by wave function size. Kane discloses a quantum computer array in which the nuclear spin resonance  $^{31}\text{P}$  is adjusted by a voltage applied to an "A-Gate". The electron wave function of the  $^{31}\text{P}$  frequency of atom is pulled away from the nucleus, thereby reducing the hyperfine interaction, which depends on the value of the wave function evaluated at the nucleus. The smaller hyperfine matrix element reduces the nuclear resonance frequency. Kane further discloses an electron mediated nuclear spin interaction, in which an electron couples adjacent nuclear spins. Figure 3 illustrates that the electron coupling is controlled with a "J-Gate". It is this electron mediated nuclear spin interaction which flips nuclear spins, thereby switching between states in a two-state system, which is required for quantum computation. The switched state depends on the mediating electrons wave function size in space, as embodied in Figure 3. The electron wave function size in space is controlled by applying a voltage to the J-Gate, which adds energy to the system, and is within the scope of changing the electrons energy.

As to claim 30, Kane discloses that the change in the particle states is detected by a corresponding change in the voltage of an electrode.

Art Unit: 2826

As to claim 31, Kane discloses two regions embodied as the region in the vicinity of the  $^{31}\text{P}$  atoms, and the region immediately under the A-Gate, where the two regions could be made of different materials.

Claims 37, 38 and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Kane. As to claim 37, Kane, Figure 2, discloses a method of switching comprising providing a particle having a wave function bound to a region, in the vicinity of a  $^{31}\text{P}$  atom, the particle, embodied as an atomic electron, from a first lower energy state, with  $V=0$ , in which the wave function of the particle has a first small extent to a second higher energy state, with  $V>0$ , in which the wave function of the particle has a second larger extent, while remaining bound to the region, and determining the state of the particle.

As to claim 38, Kane, Figure 2, discloses that the nuclear resonance frequency varies depending on the switched state of the  $^{31}\text{P}$  electron. The nuclear resonance frequency is measured by an external apparatus which would inherently contain electric charge elements, such as electrodes, which would produce a detectable voltage. Such a voltage would be read as a particular value of the nuclear resonance frequency.

As to claim 39, the detectable voltage of claim 38 could be easily converted into a proportional current.

#### ***Allowable Subject Matter***

Claim 8 is objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Kane discloses switching by changing the voltage of the gate electrodes, not by particle absorption or emission.

Claim 10 is objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Kane discloses switching by changing the voltage of the gate electrodes, not by photon absorption or emission.

Art Unit: 2826

Claim 13 is objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Kane discloses switching by changing the voltage of the gate electrodes, not by phonon absorption or emission.

Claim 19 is objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Kane discloses switching by changing the voltage of the gate electrodes, not by phonon or photon absorption or emission.

Claim 41 is objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Kane discloses switching by changing the voltage of the gate electrodes, not by particle absorption or emission.

Claims 43 and 44 are objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art discloses a structure with two separate electrodes formed on insulator layers on a gate.

Claims 46 and 48 are objected to as being dependent upon a rejected base claim, but, barring the rejection under 35 U.S.C. 112, first paragraph, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art discloses a structure with two separate electrodes formed on insulator layers on a gate, in which a voltage is applied between the electrodes creating a repulsive potential within the gate.

An examination of this application reveals that applicant is unfamiliar with patent prosecution procedure. While an inventor may prosecute the application, lack of skill in this field usually acts as a liability in affording the maximum protection for the invention disclosed. Applicant is advised to secure the services of a registered patent attorney or agent to prosecute the application, since the value of a patent



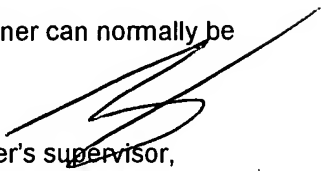
Art Unit: 2826

is largely dependent upon skilled preparation and prosecution. The Office cannot aid in selecting an attorney or agent.

A listing of registered patent attorneys and agents is available on the USPTO Internet web site <http://www.uspto.gov> in the Site Index under "Attorney and Agent Roster." Applicants may also obtain a list of registered patent attorneys and agents located in their area by writing to the Mail Stop OED, Director of the U. S. Patent and Trademark Office, PO Box 1450, Alexandria, VA 22313-1450

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

  
NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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